

REMARKS/ARGUMENTS

Claims 1, 2, 4, 7 and 8 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,289,834 to Alcorn et al. The above amendment revises the claims to more clearly define and distinguish the invention. Pursuant to 37 C.F.R. §§ 1.111 and 1.112, entry of the above amendment and reconsideration of the above application is respectfully requested. It is submitted that claim 1 as currently amended distinguishes over the disclosure of Alcorn.

In that regard, Alcorn is directed to forming more than one level of metal interconnection between transistor structures on a semiconductor chip (col. 1, lines 17-20; col. 2, lines 59-62). Fig. 7a of Alcorn shows a plan view of the final configuration of the metal interconnection (col. 2, lines 63-68). Namely, a second level metal line 20' contacts a first level metal line 8' in Fig. 7a through a via hole 18 (col. 4, lines 1-7). As can be seen from Fig. 7a, in plan view the metal lines 20' and 8' cross one another perpendicularly.

Fig. 7b shows a cross-sectional view of the structure in Fig. 7a (col. 2, lines 63-68). The first level metal line is composed of an aluminum copper silicon alloy layer 6' covered by a chromium etch-stop layer 8' (col. 4, lines 8-13). The purpose of the chromium etch-stop layer 8' is to prevent over-etching into the aluminum copper silicon alloy layer 6' such that structure such as that shown on Fig. 8b does not result (col. 4, lines 8-23; col. 1, lines 20-68).

In contrast, the present invention is in pertinent part directed to addressing difficulties that arise in connecting a solder ball to a conductor on a printed circuit board, not connecting metal lines on different levels to one another through a via hole as in Alcorn.

Claim 1 as currently amended recites “an insulative substrate” and “a conductor pattern formed on the substrate ... including a bottom surface directly contacting the substrate ... and a pair of flat angled side surfaces extending from the bottom surface to the top surface....”

This distinguishes over the disclosure of Alcorn as Alcorn does not teach or suggest a conductor directly contacting an insulative substrate and the conductor having a pair of flat angled side surfaces extending from the bottom surface to the top surface. To the contrary, Alcorn teaches a conductor 8' having a trapezoidal cross-section spaced from an insulative substrate 4 by another conductor 6' having a rectangular cross-section. The combination of the aluminum copper silicon alloy layer 6' covered by a chromium etch-stop layer 8' is not the same as the conductive pattern of the present invention. As provided in MPEP § 706.02 “for anticipation under 35 U.S.C. § 102, the reference must teach every aspect of the claimed invention either explicitly or impliedly. Any feature not directly taught must be inherently present.” Therefore, claim 1 as currently amended overcomes the rejection under 35 U.S.C. § 102 based on the Alcorn patent.

Nor is claim 1 as currently amended obvious in view of the teachings of Alcorn. As discussed above, Alcorn is directed to a different problem. Alcorn does not even mention the words “solder” or “ball” or “cracking of substrate” anywhere in the patent. As discussed in MPEP § 2143.01, there must be a suggestion or motivation to modify a cited reference to meet the limitations of a claim which is being rejected as obvious over the reference. In this situation, there is no suggestion or motivation to modify the structure taught in the Alcorn patent to meet the recitations of claim 1 as currently amended.

Claims 2, 4 and 7 all depend directly or indirectly from claim 1. Thus, claims 2, 4 and 7 all distinguish over the art cited in the Office Action for at least the same reasons as claim 1. Therefore, reconsideration and withdrawal of the rejections of claims 1, 2, 4 and 7 is respectfully requested. Specifically, claim 2 recites the conductor pattern having a trapezoidal cross-section. A trapezoid is defined in The American Heritage Dictionary of the English Language, Fourth Edition, as a quadrilateral having two parallel sides. The combination of the aluminum copper silicon alloy layer 6' covered by a chromium etch-stop layer 8' does not have a trapezoidal cross-section. It has six sides, so it is not a quadrilateral and thus, not a trapezoid. Alcorn teaches a conductor 8' having a trapezoidal cross-section spaced from an insulative substrate 4 by another conductor 6' having a rectangular cross-section.

The above amendment also revises claim 8 to more clearly define and distinguish the invention. Claim 8 as currently amended recites that etching an insulative substrate including a conductor to form a conductor pattern having a bottom surface directly contacting the substrate and a pair of flat angled side surfaces extending from the bottom surface to the top surface.

As provided in MPEP § 706.02 "for anticipation under 35 U.S.C. § 102, the reference must teach every aspect of the claimed invention either explicitly or impliedly. Any feature not directly taught must be inherently present."

Alcorn is directed to etching and does not suggest or disclose forming a conductor pattern having a bottom surface directly contacting a substrate and a pair of flat angled side surfaces extending from the bottom surface to the top surface. Hence, claim 8 as currently amended is

both novel and nonobvious. Claim 9 depends from claim 8 and therefore distinguishes over the cited art for at least the same reasons as discussed for claim 8.

Claims 5, 6 and 9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Alcorn et al. in view of Japanese Application No. 63065304 to Kimiya.

The other reference cited in the Office Action is Japanese Application No. 63065304 as published by the Japanese Patent Office, listing Kimiya as the inventor. Kimiya is directed to a different problem than the problem solved by the present invention. While Kimiya mentions the word solder, there is no disclosure of “a conductor pattern having a bottom surface directly contacting the substrate, a top surface opposite to the bottom surface, and a pair of flat angled side surfaces extending from the bottom surface to the top surface” as required by claims 1 and 8 as currently amended. Nor is there any explicit or implicit suggestion or motivation to combine the teachings of Kimiya with Alcorn. Accordingly, it is respectfully submitted that claims 1 and 8 as amended are both novel and nonobvious over the art cited in the Office Action. Claims 5 and 6 depend directly or indirectly from claim 1 and therefore distinguish over the cited art for at least the same reasons as discussed for claim 1. Claim 9 depends from claim 8 and therefore distinguishes over the cited art for at least the same reasons as discussed for claim 8. Hence, reconsideration and withdrawal of the rejection of claims 5, 6 and 9 is respectfully requested.

In view of the amendments and remarks presented above, the Applicant believes that the application is now in condition for allowance, and requests reconsideration of the application and withdrawal of the objections and rejections. The Applicant respectfully requests that the

Examiner telephone the undersigned in the event a telephone conference would expedite prosecution of the application.

Respectfully submitted,

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